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A.D. 1872, 11th DECEMBER. N° 3755.

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**Treating and Utilizing Sewage Water.**

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**LETTERS PATENT** to Henry Young Darracott Scott, of Ealing, in the County of Middlesex, Major-General, C.B., for the Invention of  
“IMPROVEMENTS IN THE TREATMENT AND UTILIZATION OF SEWAGE WATER.”

Sealed the 6th June 1873, and dated the 11th December 1872.

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**PROVISIONAL SPECIFICATION** left by the said Henry Young Darracott Scott at the Office of the Commissioners of Patents, with his Petition, on the 11th December 1872.

I, HENRY YOUNG DARRACOTT SCOTT, of Ealing, in the County of Middlesex, Major-General, C.B., do hereby declare the nature of the said Invention for “IMPROVEMENTS IN THE TREATMENT AND UTILIZATION OF SEWAGE WATER,” to be as follows:—

The objects of this Invention are economy in dealing with sewage, the effectual cleansing of the drains, and the preventing the generation of  
10 noxious sewer gases.



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*Scott's Improvements in Treating and Utilizing Sewage Water.*

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In carrying out my Invention I discontinue the present system of supplying the waterclosets and urinals of towns with pure water, and instead thereof I lay down a service by means of which the sewage water after clarification and deodorization for the removal of the excreta of the population can be returned to the houses, and used again. 5

For the clarification and deodorization of the sewage water I provide at the outfall two or more tanks or sets of tanks into which the sewage is run. In the first of these tanks (say No. 1) I allow precipitation of the fecal matters to take place after treating the sewage with lime, lime being a very efficient and the most economical agent for the 10 purpose.

On first commencing the operation double the requisite amount of lime for the defecation of the sewage is added, and tank No. 2 is not employed, but the clarified sewage surcharged with lime is pumped up and conveyed in suitable pipes back to the town and supplied to the 15 closets either on the continuous or intermittent system. This sewage water containing in solution enough free lime to defecate and deodorize a first volume of excreta then flows back to and settles in tank No. 1, cleansing the drains in its course, and effectually preventing those accumulations of glutinous nitrogen compounds which make sewer 20 gases so dangerous to health by their putrefactive decomposition. It is these accumulations also which render the first storm waters from sewers so noxious and filthy, and by the proposed treatment, as no such lodgments take place on the sides and bottom of the sewers, the first storm waters will consist only of very diluted fresh sewage. 25

The matters first deposited in tank No. 1 having been collected, dried, and burned to lime by well-known methods, this lime, mixed with such an additional quantity of ordinary lime as will suffice to defecate a third volume of sewage, is now stirred in with the sewage effluent from tank No. 1, and after the subsidence of the insoluble particles in tank No. 2 30 is again pumped back to the town to be thrown into the waterclosets as before.

The undissolved residue which remains in tank No. 2 (consisting chiefly of silicate and phosphate of lime with notable quantities of nitrogenous organic matter) will afford a valuable manure. It is therefore collected 35 and dried for that purpose.



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*Scott's Improvements in Treating and Utilizing Sewage Water.*

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A portion of the sewage water on its return flow into the town may be utilized by market gardeners and for pleasure grounds, and having sufficient head to command much of the agricultural land in the neighbourhood may be advantageously used for irrigation.

5 As the sewage water, if allowed to run into the ordinary drains or sewers, will receive continual additions from subsoil drainage, surface water, and water which has been used for domestic purposes, such as for washing and cooking, it will be necessary to provide an outlet for such excess of water as cannot be advantageously employed for  
10 the closets or for irrigation purposes. As much as flows between 12 o'clock at night and six o'clock in the morning, consisting mainly of subsoil water flowing through perfectly clean drains, may be discharged without much harm into the nearest watercourse, or it may be filtered through a small area of ground.

15 The remainder of the excess is purified by chemical processes, and its ammonia extracted by a process for which I have already obtained Letters Patent; or this operation may be effected by any other method, as the water flows from tank No. 1 after the extraction of its suspended matters. It is then allowed to pass away into the nearest watercourse,  
20 or may be used for irrigation.

The action of the lime on the sewage water will convert much of the nitrogen compounds into ammonia, but this substance will also to some extent be expelled by it; I therefore provide ventilating shafts along the lines of the main sewers, and at the summit level. In these shafts  
25 is placed coke moistened with acid or other substances which can absorb and retain ammonia.

In the cisterns and also in the pans of closets the film of carbonate of lime which rapidly forms will prevent the escape of ammonia at these points.

30 By the above means the present serious evil of the pollution of rivers by town sewage will be completely remedied without entailing any expense on communities. The value of the sewage merely as water for the supply of closets for flushing purposes, where the existing drains are badly laid, would cover the expense of any alteration required by  
35 my Invention.

The value of the water for irrigation purposes, commanding as it would (from the high level to which it is raised) the best ground in the



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*Scott's Improvements in Treating and Utilizing Sewage Water.*

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neighbourhood for taking it, and the value of the ammonia which in the more concentrated form in which it would exist in such sewage water could be readily extracted by the process indicated, would amply repay the cost which towns would have to encounter in laying down the new service, and for the erection of pumping works. 5

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**SPECIFICATION** in pursuance of the conditions of the Letters Patent, filed by the said Henry Young Darracott Scott in the Great Seal Patent Office on the 11th June 1873.

**TO ALL TO WHOM THESE PRESENTS SHALL COME, I, HENRY YOUNG DARRACOTT SCOTT**, of Ealing, in the County of Middlesex, 10 Major-General, C.B., send greeting.

**WHEREAS** Her most Excellent Majesty Queen Victoria, by Her Letters Patent, bearing date the Eleventh day of December, in the year of our Lord One thousand eight hundred and seventy-two, in the thirty-sixth year of Her reign, did, for Herself, Her heirs and successors, give 15 and grant unto me, the said Henry Young Darracott Scott, Her special licence that I, the said Henry Young Darracott Scott, my executors, administrators, and assigns, or such others as I, the said Henry Young Darracott Scott, my executors, administrators, and assigns, should at any time agree with, and no others, from time to time 20 and at all times thereafter during the term therein expressed, should and lawfully might make, use, exercise, and vend, within the United Kingdom of Great Britain and Ireland, the Channel Islands, and Isle of Man, an Invention for "**IMPROVEMENTS IN THE TREATMENT AND UTILIZATION OF SEWAGE WATER**," upon the condition (amongst others) that I, the said 25 Henry Young Darracott Scott, my executors or administrators, by an instrument in writing under my, or their, or one of their hands and seals, should particularly describe and ascertain the nature of the said Invention, and in what manner the same was to be performed, and cause the same to be filed in the Great Seal Patent Office within six 30 calendar months next and immediately after the date of the said Letters Patent.

**NOW KNOW YE**, that I, the said Henry Young Darracott Scott, do hereby declare the nature of my said Invention, and in what manner



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*Scott's Improvements in Treating and Utilizing Sewage Water.*

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the same is to be performed, to be particularly described and ascertained in and by the following statement (that is to say) :—

The objects of this Invention of improvements in the treatment and utilization of sewage water are, 1, economy in dealing with sewage ;  
5 2, the effectual cleansing of the drains ; and 3, the preventing the generation of noxious sewer gases.

In carrying out my Invention I discontinue the present system of supplying the waterclosets and urinals of towns with pure water, and instead thereof I lay down a service by means of which the sewer water  
10 after clarification and deodorization for the removal of the excreta of the population can be returned to the houses and used again.

For the clarification and deodorization of the sewage water, I provide at the outfall two or more tanks or sets of tanks into which the sewage is run. In the first of these tanks (say No. 1) I allow precipitation of  
15 the fœcal matters to take place after treating the sewage with lime, lime being a very efficient and the most economical agent for the purpose.

On first commencing the operation double the requisite amount of lime for the defecation of the sewage is added, and tank No. 2 is not employed, but the clarified sewage (surcharged with lime) is pumped up  
20 and conveyed in suitable pipes back to the town, and supplied to the closets either on the continuous or intermittent system. This sewage water containing in solution enough free lime to defecate and deodorize a fresh volume of excreta, &c., then flows back to and settles in tank No. 1, cleansing the drains in its course, and effectually preventing those  
25 accumulations of glutinous nitrogenous compounds which make sewer gases so dangerous to health by their putrefactive decomposition. It is these accumulations also which render the first storm waters from sewers so noxious and filthy. As by my novel treatment of the sewage waters no such lodgments take place on the sides and bottom of the sewers the  
30 first storm waters will consist only of very diluted fresh sewage.

The matters first deposited in tank No. 1 having been collected, dried, and burned to lime by well-known methods, this lime, mixed with such an additional quantity of ordinary lime as will suffice to defecate a third volume of sewage, is now stirred in with the sewage effluent from tank  
35 No. 1, and after the subsidence of the insoluble particles in tank No. 2, the sewage effluent is again pumped back to the town in order to be used in the waterclosets as before.



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*Scott's Improvements in Treating and Utilizing Sewage Water.*

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The undissolved residue which remains in tank No. 2 (consisting chiefly of silicate and phosphate of lime, with notable quantities of nitrogenous organic matter) will afford a valuable manure. It is therefore collected, dried, and sold or used for that purpose.

A portion of the sewage water on its return flow into the town may be 5 utilized by market gardeners and for pleasure grounds, and having sufficient head to command much of the agricultural land in the neighbourhood may be advantageously used for irrigation.

As the sewage water if allowed to run into the ordinary drains or sewers will receive continual additions from subsoil drainage as well as 10 from surface water, and water which has been used for domestic purposes (such as for washing, cooking, &c.), it will be necessary to provide an outlet for such excess of water as cannot be advantageously employed for the closets or for irrigation purposes. As much water as flows between twelve o'clock at night and six o'clock in the morning, 15 consisting mainly of subsoil water flowing through perfectly clean drains, may be discharged without much harm into the nearest watercourse, or it may be filtered through a small area of ground.

The remainder of the excess is purified by chemical processes, and its ammonia extracted by a process for which I have already obtained 20 Letters Patent, or this operation may be effected by any other method as the water flows from tank No. 1 after the extraction of its suspended matters. It is then allowed to pass away into the nearest watercourse, or may be used for irrigation.

The action of the lime on the sewage water will convert much of the 25 nitrogen compounds into ammonia, but this substance will also (to some extent) be expelled by it. I therefore provide ventilating shafts along the lines of the main sewers and at the summit level. In these shafts is placed coke moistened with acid or other substances, which can absorb and retain ammonia.

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In the cisterns and also in the pans of closets the film of carbonate of lime which rapidly forms will prevent the escape of ammonia at these points.

By the above means the present serious evil of the pollution of rivers by town sewage will be completely remedied without entailing any 35 expense on communities. The valve of the sewage merely as water for



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*Scott's Improvements in Treating and Utilizing Sewage Water.*

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the supply of closets and for flushing purposes (where the existing drains are badly laid) would cover the expenses of any alteration required by my Invention.

The value of the water for irrigation purposes, commanding as it  
5 would (from the high level to which it is raised) the best ground in the neighbourhood for taking it, and the value of the ammonia which (in the more concentrated form in which it would exist in such sewage water) could be readily extracted by the process indicated, would amply repay the cost which towns would have to encounter in laying down the  
10 new service, and for the erection of pumping works.

Having now described my Invention of improvements in the treatment and utilization of sewage water, and having explained the manner of carrying the same into effect, I claim as the Invention secured to me by Letters Patent as aforesaid, treating sewage water in the manner herein  
15 set forth, and utilizing the clarified effluent water for flushing, irrigation, and watercloset purposes by causing it, when properly clarified, to be conveyed back again in suitable service pipes either to houses where it may be again used in the waterclosets, or to any other place or places where it may be used for any of the purposes above mentioned.

20 In witness whereof, I, the said Henry Young Darracott Scott, have hereunto set my hand and seal, the Eleventh day of June, in the year of our Lord One thousand eight hundred and seventy-three.

HENRY Y. D. SCOTT. (L.S.)

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